EB2030E

Planting Date Guide for Winter Wheat Cover Crops to Control Wind Erosion in the Columbia Basin

WASHINGTON STATE UNIVERSITY EXTENSION

Planting spring crops into a winter wheat cover crop on the Columbia Basin of Central Washington

WASHINGTON STATE UNIVERSITY EXTENSION

Planting Date Guide for Winter Wheat Cover Crops to Control Wind Erosion in the Columbia Basin

H. Kok, R. Papendick, K. Saxton, W. Pan and R. Bolton

Cover crops are a practical conservation measure to control wind erosion during critical times when crop residues alone are insufficient for soil protection. Air quality monitoring in eastern Washington indicates that the probability of major dust storms is highest in September through November, and in March. In the irrigated Columbia Basin these times coincide with post-harvest of late summer and fall crops, and with spring planting when soils are often dry and bare, and winds can be strong. Low-residue crops such as dry beans, onions, carrots, and potatoes seldom leave enough cover to control wind erosion after harvest in late summer and fall. In these situations, a cover crop can provide sufficient protection in the fall and through spring planting if it is seeded at a date early enough to provide adequate canopy growth.

This brochure provides a guide for determining possible winter wheat planting dates for adequate fall cover on irrigated lands, based on field and prediction studies by Washington State University (T.K. Kunch, 2001). Winter wheat is a choice crop because it is well adapted to the Columbia Basin; has the ability to emerge, grow and produce ground cover without danger of frost kill; and withstands considerable sandblasting in a windstorm. Plus, Basin producers are familiar with how to grow it and seed costs are generally reasonable.

Surface cover requirements for erosion control

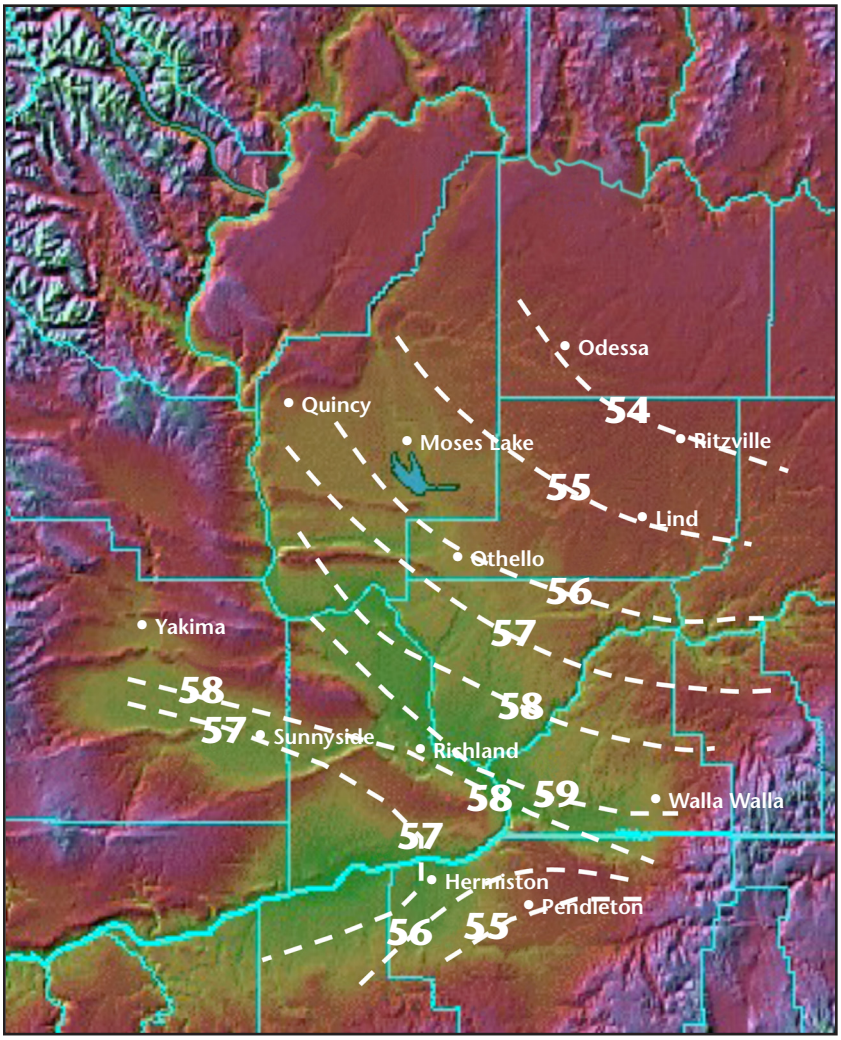
Protection from wind erosion using a cover crop requires planting early enough to achieve a minimum of 30–35% surface cover before low temperatures limit further growth. Late summer- or early fall-planted winter wheat can often meet this requirement. Later seeding may not achieve adequate growth depending on the seeding date and location. Adequate cover crop growth will reduce erosion to about 15% of the maximum potential loss from a bare, smooth surface and is considered an acceptable level of control for most soils in the Columbia Basin. Surface roughness can supplement erosion control provided by the green cover. Moreover, most fields retain various amounts of carryover surface residues, both flat and standing, that also contribute to the cover requirement.

Location-Climate (L-C) index

A location-climate (temperature) index was developed from analyses of thirty-year (1963–93) air temperature records at fifteen locations and mapped as six isotherms (lines of equal mean September–October temperatures, 54 to 59°F) across the Columbia Basin counties (Fig. 1). Elevation differences and wind patterns may affect average temperatures within localized areas and cause deviations from those in the generalized map, requiring minor adjustments from those in Figure 1 based on experience with local conditions.

Figure 1. Location-Climate (temperature) indexes across the Columbia Basin.

The dotted lines represent isotherms (lines of equal temperature) across counties at a given time. The numbers are average September–October temperatures (°Fahrenheit) over a thirty-year period.



Source: Original figure, created for this publication by the authors. Background obtained from University of Washington Libraries: http://fermi.jhuapl.edu/states/maps1/wa_c.gif

Winter wheat planting dates

Temperatures in August are generally warm enough to ensure adequate cover growth for wind erosion control during the fall from wheat planted any day that month. From September and later, temperatures decrease and limit the rate of cover establishment. Table 1 shows the relationship between planting dates and the dates when 30–35% cover would be expected for each isotherm location in Figure 1. Planting dates for each index are given in ten-day increments beginning on 1 September and ending on 10 October. The *early* and *late* values for each planting date represent possible variation from the average date, in days, of when to expect 30–35% cover, based on likely variations of *above* and *below* average temperatures, respectively, after planting. The 30–35% cover would not be expected at any location with wheat planted after about October 15. As a rule, sowing winter wheat after this date should not be attempted because of insufficient heat units to establish 30–35% cover until spring warm-up.

Table 1. Dates predicted to achieve 30–35% cover for *Stephens* winter wheat planted at different dates across the Location-Climate indexes of Figure 1.

Location-Climate Index[1]	Planting Date	Dates for 30–35% cover		
		No. of Days Early[2]	Average Date	No. of Days Late[3]
54	1 Sept	3	9/20	4
	10 Sept	4	10/3	6
	20 Sept	6	10/19	12
	1 Oct	—[4]	—	—
	10 Oct[5]	—	—	—
55	1 Sept	2	9/20	4
	10 Sept	3	10/2	5
	20 Sept	5	10/17	10
	1 Oct	11	11/13	18
	10 Oct	33	12/28	—
56	1 Sept	2	9/19	3
	10 Sept	3	10/1	5
	20 Sept	5	10/15	9
	1 Oct	9	11/9	16
	10 Oct	28	12/20	—
57	1 Sept	2	9/18	3
	10 Sept	2	9/30	4
	20 Sept	4	10/13	7
	1 Oct	8	11/5	14
	10 Oct	23	12/11	—
58	1 Sept	2	9/17	2
	10 Sept	2	9/29	4
	20 Sept	3	10/11	6
	1 Oct	6	11/1	11
	10 Oct	18	12/3	—
59	1 Sept	1	9/16	2
	10 Sept	2	9/28	3
	20 Sept	2	10/9	4
	1 Oct	4	10/29	8
	10 Oct	12	11/20	—

[1]Location-Climate (L-C) indexes mapped in Figure 1.
[2]The earliest, in days, before the average date to expect 30–35% canopy cover establishment under a regimen of above-average daily temperatures.
[3]The latest, in days, after the average date to expect 30–35% canopy cover establishment under a regimen of below-average daily temperatures.
[4]Adequate canopy cover was not expected because of insufficient heat units.
[5]Adequate canopy cover was not expected for plantings after October 20 for any location because of insufficient heat units.

Procedure for evaluating planting dates

Use Figure 1 and Table 1 together to evaluate planting dates and to estimate dates of effective fall crop cover for erosion control for your field location.

1. Refer to Figure 1 to determine the L-C index nearest your field.
2. Pick an approximate planting date in Table 1 for a given L-C index value, and check the likely date that 30–35% cover would be expected, with possible days earlier or later due to climatic variation.
3. Note that dates with no canopy values (indicated by —) indicate that adequate canopy cover is unlikely to be achieved for that location and planting date. Since a lesser canopy would be expected, either do not seed or try a different crop.

For example, if the location lies on or near isotherm 55 in Figure 1 and the planting date is September 20, the average date for 30–35% cover would be estimated as October 17. Cover establishment could be up to five days earlier for above-average temperatures (the No. of Days Early column) and up to ten days later for below-average temperatures (the No. of Days Late column).

Field locations will often be between isotherms shown in Figure 1, and the planting date between those listed in Table 1, thus some interpolation between values may be needed. Deviations of 10 or 20% from one of the isotherms and one or two days from a given planting date will produce only a small change which may generally be ignored or adjusted slightly by judgment. Larger deviations may be interpolated across the ranges of both the planting dates and the L-C indexes.

For example, assume the field location lies halfway between isotherms 55 and 56 and the expected planting date is September 25. From Table 1, find that the average date for 30–35% cover establishment for the September 20 planting date is October 17 for isotherm 55 and October 15 for isotherm 56, or about October 16 for a location halfway between the two isotherms. Similarly, the average date for cover establishment for the October 1 planting date is November 13 for isotherm 55 and November 9 for isotherm 56, or about November 11 for a location halfway between. The average date of cover establishment for this location and the September 25 planting date would be halfway between October 16 and November 11 or approximately October 29–30, or simply late October.

With above-average temperatures at the mid-index location, cover establishment could be seven or eight days earlier than the average date for the September 25 planting date. Determine this by adding the number of early days for September 20 and October 1 for isotherm 55 to those for isotherm 56 and divide by 4:

$$(5 + 11 + 5 + 9)/4 = 7.5$$

With below-average temperatures, cover could be about thirteen days later than the average date:

$$(10 + 18 + 9 + 16)/4 = 13$$

This procedure for evaluating planting dates and estimating winter wheat canopy cover should be considered a general guide for various locations within the Columbia Basin farming region. The accuracy of both the data and the interpretation, along with the variability of annual climatic conditions, suggest that this information should only be considered in conjunction with local experience as a decision aid for establishing effective crop cover for wind erosion control.

REFERENCE

Kunch, T. K. 2001. Radar assessment and GIS decision support of cover cropping in the Columbia basin. MS thesis, Washington State Univ.

Cover photo by Andy Mcguire, WSU Grant County Extension.

You may order copies of this and other publications from WSU Extension Publishing and Printing, at 1-800-723-1763 or http://pubs.wsu.edu.

Issued by Washington State University Extension and the U.S. Department of Agriculture in furtherance of the Acts of May 8 and June 30, 1914. Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, sex, religion, age, color, creed, and national or ethnic origin; physical, mental, or sensory disability; marital status or sexual orientation; and status as a Vietnam-era or disabled veteran. Evidence of noncompliance may be reported through your local WSU Extension office. Trade names have been used to simplify information; no endorsement is intended. Published April 2008. Subject codes 244, 372.

EB2030E